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Working Paper

Eastern Germany in the fifth year - investment hammering in the basement?

Kieler Diskussionsbeiträge, No. 250

Provided in cooperation with:
Institut für Weltwirtschaft (IfW)

KIELER DISKUSSIONSBEITRÄGE

KIEL DISCUSSION PAPERS

250

Eastern Germany in the Fifth Year — Investment Hammering in the Basement?

by Horst Siebert

CONTENTS

- Rebuilding the capital stock will play the decisive role in the adjustment process in the eastern German economy. Investment increased from DM 92 billion in 1991 to 157 billion in 1994 (in current prices). It amounted to 60 percent of GDP. Investment has been heavily concentrated in buildings; only one-third has gone to machinery and equipment. Less than 20 percent of investments have gone to industry.
- Using back-of-the envelope calculations, it is shown that eastern Germany still needs a massive capital accumulation in the years to come, more than DM 1 trillion in the enterprise sector. In addition, the housing sector and infrastructure will require sizeable investment.
- In the adjustment process in the eastern German economy, the J-curve of transition with respect to production and the u-curve with respect to employment are becoming evident. Because transfers have stimulated the nontradables sector, a Dutch-disease phenomenon has been superimposed on the transformation problem. The production of nontradables in some sectors has doubled since the second half of 1990, as, for instance, in construction and in construction-related industries. However, in the tradables sector, especially in the capital goods sector, the 1990 production level has not yet been reached. An export basis has not yet been developed.
- With respect to GDP, the catching-up process has taken place with remarkable speed. GDP per capita (in current prices) rose from 31 percent of the western German level in 1991 to 47.9 percent in 1994. This implies a convergence rate of roughly 6-7 percent per year, which is by far higher than the Barro rule of 2 percent.
- Assuming a target of 80 percent of the western German GDP per capita level, the growth gap for alternative growth differentials between eastern and western Germany is calculated. If eastern Germany had a growth advantage of 5 percent, it would reach 80 percent of the western German GDP per capita level in 2004. If west Berlin is included in eastern Germany, the target is reached two years earlier.
- Economic policy for eastern Germany will have to return to normality in the future, treating eastern Germany as just any other region in Germany. Transfers will have to be reduced. The excess of absorptive consumption over domestic production will have to be reduced and the difference between the trade deficit and gross investment will also have to be reduced. Whereas eastern Germany seems to be moving in the right direction, German unification has drastically disturbed the macroeconomic policy mix between fiscal policy, wage policy and monetary policy, and Germany will be occupied for some time in trying to find a sustainable steady-state position in that policy mix.

INSTITUT FÜR WELTWIRTSCHAFT KIEL · APRIL 1995

ISSN 0455-0420

Contents

Paper presented at the European University Institute in Florence, March 16, 1995. This paper is a sequel to my previous Kiel Discussion Papers: "The Economic Integration of Germany" (No. 160, May 1990), "The Economic Integration of Germany — An Update" (No. 160a, September 1990), "Five Traps for German Economic Policy" (No. 185, April 1992), "The Big Bang with the Big Brother. German Unification in Its Third Year" (No. 211, May 1993), "German Unification and Its Impact on Net Savings" (No. 216, April 1993), and "Integrating the Eastern Länder. How Long a Transition?" (No. 229, April 1994). I appreciate comments from Alfred Boss, Dietmar Gebert, Axel Schimmelpfennig, Klaus-Dieter Schmidt and Ingo Thomas.

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Siebert, Horst:
Eastern Germany in the fifth year - investment hammering in the basement? / By Horst Siebert. Institut für Weltwirtschaft Kiel. - Kiel : Inst. für Weltwirtschaft, 1995
(Kiel discussion papers ; 250)
ISBN 3-89456-094-0
NE: Kieler Diskussionsbeiträge

ISSN 0455 - 0420

Eastern Germany in the Fifth Year — Investment Hammering in the Basement?

In this paper, the adjustment process in the eastern German economy is studied. Theoretical analysis of the transformation process suggests a J-curve of adjustment in production and capital stock and a u-curve of adjustment in employment (Section I). The empirical data correspond to these hypotheses (Section II). A fascinating question is how the adjustment process will proceed in the future (Section III). Here, investment and the building-up of a new capital stock will play a crucial role. As in the Hicksian theory of the business cycle, where autonomous investment hammering in the basement will eventually move an economy out of recession (Hicks 1950, p. 105), capital accumulation in eastern Germany will play the decisive role in the adjustment process. As investment activity increases, the question arises as to when economic policy for eastern Germany will be able to return to normality (Section IV). Meanwhile, the economic shock that German unification caused its European neighbors can be considered as a bygone (Section V).

I. Transition as a Shock to a Socialist Economy

In the economics of transition, eastern Germany is a special case among the post-socialist economies. Monetary stabilization was achieved instantaneously by extending the currency area of the D-mark to eastern Germany in the monetary union of July 1, 1990. The institutional infrastructure was, in principle, introduced in one stroke when eastern Germany joined western Germany, according to Article 23 of the German constitution, on October 3, 1990. Thus, the approach to transformation was a big bang: Of the three major areas of economic reform in the process of transformation (Siebert 1994b), only the third major area of reform remains to be tackled, namely, the real adjustment in the economy, especially in the previously state-owned firms. Here, transfers from western Germany have eased the transformation process, so that the eastern German case can be interpreted as a big bang with the big brother (Siebert 1993c).

The transition from central planning to a market economy can be interpreted as a shock to the economic system. Whereas in eastern Germany an institutional void, characteristic of the transformation in Eastern Europe, was prevented, the economic environment was completely changed for the existing firms. In the tradables sector, they were exposed to international competition. In the nontradables sector, the splitting up of firms into smaller units implied that firms would lose their monopolistic position. Moreover, a new price vector prevailed to which firms had to adjust. As a rule, relative prices for tradable goods fell because of the intensification of competition, because of a redefinition of scarcities and because of the abolition or reduction of subsidies. Whereas producers' prices for tradable products went down, prices for inputs, for instance, for foreign intermediate products, labor, energy and for the use of the environment, increased. What was of particular importance was that firms had to bear the costs of financial capital that had previously been provided free of charge.

The competitiveness of a representative firm was not only determined by the pressures of decreasing product prices and increasing factor prices, but, additionally, by product quality, which socialist firms have hitherto not produced and to which the new competition also pertained. Thus, the transition to a market economy confronted firms with a completely different set of restrictions in their profit calculations — they faced a real shock. The sudden change in the economic setting entailed a massive devaluation

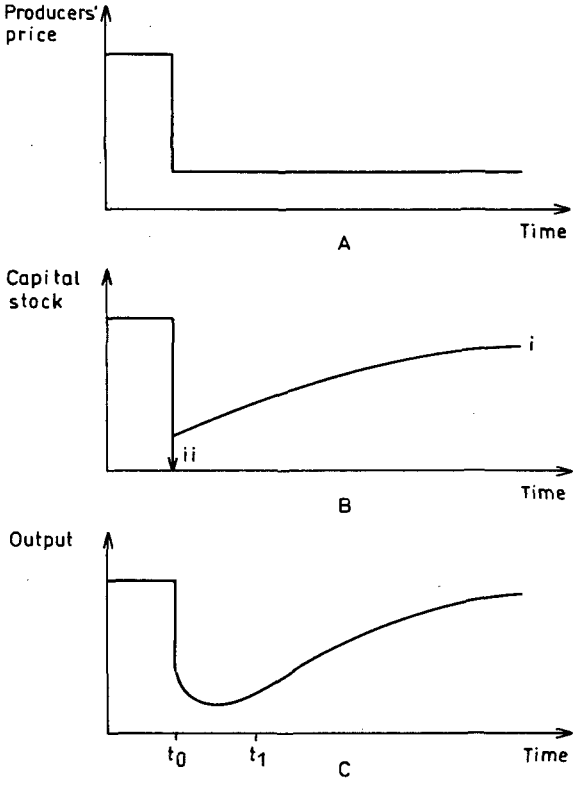
of the firms' assets, which became partially or completely obsolete.[1]

Using the abrupt decrease in the producers' prices as simplifying representation of the shock and assuming a given technology and capital stock, it can be shown that the present value of profits, i.e., the value of the firm, will decrease (Van Long and Siebert 1992). For most eastern German firms, this shock has proven to imply negative profits; that is, without thorough restructuring and an injection of new capital and new technology, most of the firms were not viable.

The above analysis suggests a typical adjustment path for the representative firm and — aggregating over all the firms — for the economy as a whole. The price shock leads to an instantaneous devaluation of the existing capital stock. If the firm can sustain production at all (path *i* in Figure 1B), investments will build up a new capital stock. Otherwise, the value will fall to zero (path *ii*). Depending on the lags resulting from planning investment projects, from administrative procedures and from construction, the increase in the capital stock will take time. That is, after the initial drop, the time profile will show a smooth increase in the new capital stock.

The time profile of production corresponds to the time profile of the capital stock. Output decreases when investment projects are implemented and when firms close. That is, both capital stock and production broadly follow a J-shaped path, with an immediate drop after the shock and a gradual recovery (Figure 1C). The drop in production is accompanied by a drop in employment. The sudden reduction in the value of the capital stock forces a fall in employment, as the firm becomes unable to earn the labor costs with the initial capital equipment. Consequently, labor demand is rapidly reduced, and only increases with investment, in most cases to a level lower than the original level, because the initial level of employment was distorted. Thus, a u-curve of employment corresponds to the J-curve of production, with the ultimate peak falling short of the initial employment level.

Figure 1 – Time Profile of Adjustment



II. The Adjustment Process

In the following, actual adjustments in production, in employment and in the capital stock are discussed in more detail.

1. Adjustment in Production

The J-curve of the real adjustment process has different shapes for different young market economies. The most pervasive fall in production has been observed in eastern Germany. There, industrial production decreased to a third of its 1989 level in 1991 (Figure A1),[2] whereas in Poland, in the Czech Republic and in Hungary the decline was much smaller. This is not surprising, because eastern Germany did not

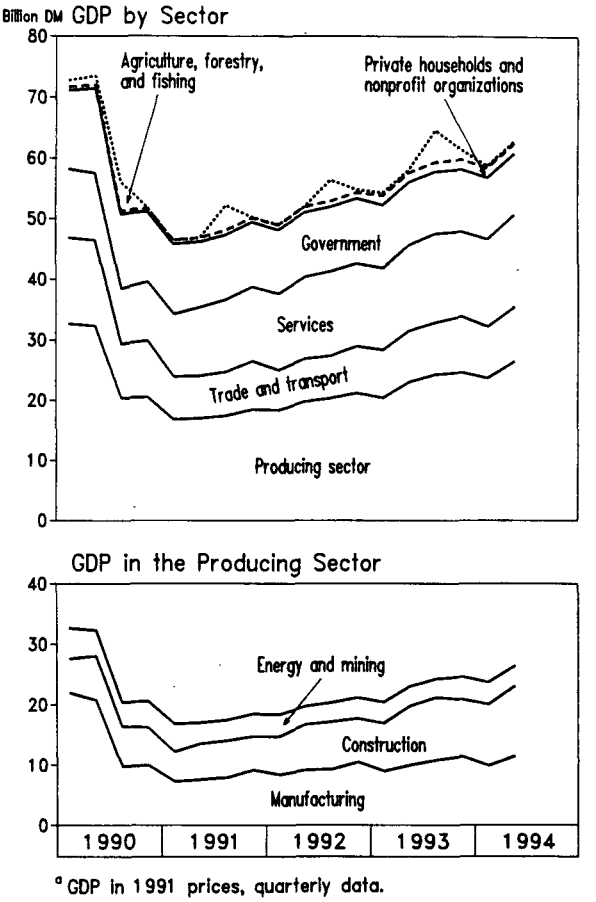
have the exchange rate and the wage rate as shock absorbers.

Establishing the private ownership of firms and real estate — an important precondition for adjustment to take place — required time. Meanwhile, the Treuhand Agency has privatized the whole enterprise sector of the eastern German economy within four years, with only 65 firms out of 13,800 still to be privatized (December 1994). Only 20,000 employees of originally 4 million remain on the payrolls of Treuhand. As regards the restitution of private property, roughly 50 percent of the 2.3 million applications (of which 2.1 million relate to houses and lots) have been processed (end of 1994). In the last two years, property rights problems have not been an issue when firms have been privatized. But they are still relevant in the housing sector, and consequently for the development of the inner cities.

The adjustment process in eastern Germany is characterized by the relatively strong expansion of the nontradables sector. In the local and regional goods sector, the adjustment process is proceeding smoothly. This holds for construction and for the construction-related industries, for the crafts, and for the services sector. The contribution of these sectors to GDP has risen (Figure 2).[3] In the nontradables sector, the index for net production increased considerably between the fourth quarter of 1990 and the fourth quarter of 1994 (Table A1), for instance in structural metal products which are construction-related (110.6 percent), metal products (74.6 percent), printing (74.9 percent) and in the construction industry (115.8 percent).

The reason why the nontradables sector adjusted more quickly than the tradables sector is that nontradables were not exposed to international competition in the product markets and that new firms could be established with less difficulty. Moreover, local markets were a nice target for direct investment from outside. In addition, a Dutch-disease phenomenon was superimposed on the adjustment process in the new *Länder* as a result of the transfers from western Germany to eastern German households (Siebert 1993a; Greiner et al. 1994). These transfers have stimulated consumption demand

Figure 2 – GDP in Eastern Germany by Sector[a]



[a] GDP in 1991 prices, quarterly data.

for nontradables; the nontradables sector has attracted capital and qualified labor, and has driven up factor costs, including wages, in the tradables sector. It should be noted, however, that the whole gap between eastern German aggregate demand and GDP (in 1994 DM 466.8 million versus DM 255.9 million in 1991 prices) is not relevant for the Dutch-disease phenomenon, since the trade deficit (DM 210.9 million in 1994) is partly the counterposition to external direct investment.

In the tradables sector, however, especially in the capital goods sector, things do not look so bright. It has been extremely difficult for eastern German firms to establish themselves in western German and international markets, to develop the right product for a market niche, and to break into existing relations between buyers and sellers. An export base has not yet been clearly established.

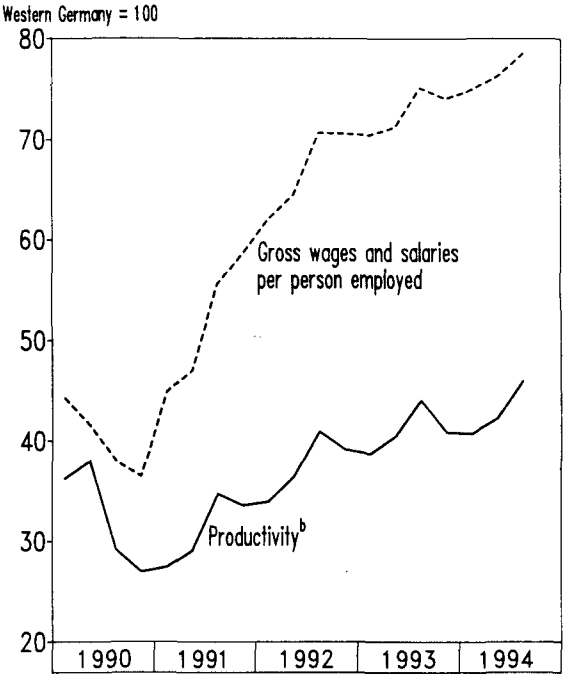
In 1994, the producing sector, which comprises energy, mining, manufacturing and con-

struction, actually reached the production level of the second half of 1990 (for more details, see Table A1). The output index in manufacturing stood at 84.2 percent of the level in the second half of 1990. In the capital goods industry, the output index only reached 64.7 percent of its original level. In the electrical engineering industry, the output index was at 67.3 percent. The mechanical engineering industry (32.2) and the optical industry (including precision engineering and watches) (24.8) had even lower output levels. These data clearly indicate a deindustrialization of the eastern German economy. The deindustrialization of eastern Germany, having at its root the inefficiency and obsoleteness of the capital stock inherited from the socialist planning system, was aggravated by the conversion rate of 1:1 between the Ostmark and the D-mark, which amounted to an appreciation of the Ostmark of about 400 percent, and by wage policy (see below).

2. Adjustment in Employment

There is still a large gap between labor productivity and wages in eastern Germany. In the third quarter of 1994, labor productivity (output per person engaged, including self-employed) was at 46 percent of the western German level in 1991 constant prices and at 55.2 percent in current prices[4] (Figure 3), gross wages (Bruttolohn- und -gehaltssumme) were at 78.4 percent. Nominal wages in eastern Germany were at roughly 84 percent of the western German level at the end of 1994 (although the working hours in eastern Germany are longer and vacations are shorter). Construction-related sectors and some sectors in eastern Berlin reached the western German wage level. Most sectors were in the upper 80 percent range: construction (90 percent), banking (88.5 percent) and insurance, retail trade and government (84 percent). Even the sectors with tremendous economic difficulties, the metal and electrical engineering industries and iron and steel, paid more than 80 percent. In the eastern German economy, unit labor costs reached 130 percent of the western German level in 1994, indicating that this region is still not competitive in terms of labor costs (Sachverständigenrat 1994, p. 113). Labor's share in national income (including calculated entrepreneurial wages) — which was 78.5 percent in western Germany — amounted to 97 percent in 1994 (Sachverständigenrat 1994, p. 114).

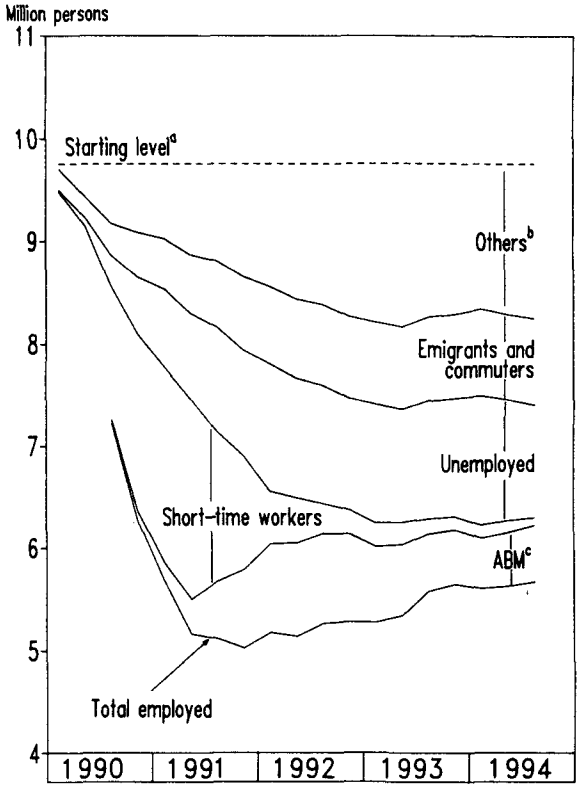
Figure 3 – Eastern and Western German Wages and Productivity Ratios[a]



[a] National income accounting, domestic concept. – [b] Real GDP per person engaged (including self-employed persons).

Adjustment in the labor market shows part of the expected u-curve (Figure 4). Employment in the eastern German economy, excluding labor-market schemes, reached already a turning point in 1991; employment (including short-time workers and governmental employment schemes) reached its turning point in 1994. Whereas the number of persons in explicit labor market schemes (ABM) has not been reduced drastically, short-time work arrangements (which once encompassed 2 million persons) have been cut considerably.

Figure 4 – Employment in Eastern Germany, 1990–1994



[a] Fourth quarter 1989. – [b] For instance, early retirement, hidden labor force reserve. – [c] Employees in job-preserving schemes and retraining programs.

3. Adjustment of the Capital Stock

It will be fascinating for economic historians to determine to what extent the capital stock of eastern Germany became obsolete when the new economic system was adopted. It is extremely difficult to specify what the market value of the existing capital stock was for the old and for the new price vector, i.e., prior and after German unification. When tackling this difficulty, the capital stock of infrastructure, housing and enterprises in the tradables and nontradables sector must be distinguished. It is to be assumed that the capital stock of the tradables sector will have had an extremely low value and that it will require a relatively high investment. A very crude approach would be to use the eastern German productivity in relation to western German productivity as a proxy for the value of the eastern German capital stock. Very early in the transformation process, I estimated that productivity (and the value of the capital stock) were one-third of the western German level (Siebert 1990), coming close to productivity in per capita terms of 27 percent that was eventually measured statistically for the fourth quarter of 1990. This figure implies that more than 70 percent of the capital stock of eastern Germany will have to be written off.

Alternatively, one will have to scrutinize the vector of capital goods and to evaluate which specific capital goods should be deleted from the capital inventory. This would be equivalent to an immediate write-off of 100 percent. Besides this category of capital goods with a value of zero in 1990, a second category of capital goods could still be used, but only partly, so that its value has to be scaled down instantaneously to a considerable extent. The remaining value would have to be written off over a number of years. A third category may be written off using a more or less normal rate of depreciation.

Capital requirements of eastern Germany can be estimated using a very simple formula (Siebert 1993c). It is assumed that eastern Germany will have the same capital stock per capita as western Germany after the transformation process has eventually been completed; the western German capital stock is assumed to grow at a rate of 2.5 percent. Considering a fifteen-year period of adjustment, the capital stock of the enterprise sector in eastern Germany would be DM 1,750 billion by the year 2005. This is a back-of-the-envelope calculation for accumulated investment, which assumes that eastern Germany's existing capital stock is completely obsolete. Assuming that one-third of the capital stock is usable, and considering again a fifteen-year period of adjustment, a rough calculation shows that the enterprise sector would need private investment amounting to DM 80 billion per year. Using the infrastructure of western Germany as a frame of reference, infrastructure capital in eastern Germany would amount to DM 730 billion after adjustment. This figure includes public buildings and equipment, roads, railroads, postal and communications infrastructure, and waterways. Assuming that one-third of eastern Germany's capital stock is usable, public investment amounting to DM 40 billion per year would be needed. Of course,

recreating the capital stock in infrastructure will require more than fifteen years. These calculations do not include the housing sector, which will require still more time to be rebuilt (Table 1).

Investment will be the decisive variable for growth in eastern Germany. It increased from DM 92.1 billion in 1991 to DM 157 billion in 1994 (in 1991 prices). It is estimated that DM 180 billion will be invested in 1995 (also in 1991 prices) (Table 2). Investment in the enterprise sector, including housing, railroads, postal services, and telecommunications, accounted for the larger part of total investment, roughly for 85 percent. In 1994, investment amounted to 60 percent of GDP.

Investment is heavily concentrated in buildings, only one-third of the investment outlays are in equipment. Investment in equipment has remained constant relative to eastern German GDP at roughly 20 percent although gross investment has risen (see Figure 7). In the enterprise sector (DM 94.5 billion in 1993), the bulk of investment outlays has gone to retail and transportation (DM 35.3 billion), services (DM 10.6 billion) and mining (DM 10.9 billion); DM 27.3 billion has gone to manufacturing (Deutsches Institut für Wirtschaftsforschung and Institut für Weltwirtschaft 1995, Table 1).

Calculations of the eastern German capital stock are still preliminary. In the years 1991 and 1992, the statistically imputed scrapping of capital goods exceeded the accruals. It is estimated that in 1994 accruals were greater than scrappings by 2 to 1 (Deutsches Institut für Wirtschaftsforschung and Institut für Weltwirtschaft 1995). The capital stock in eastern Germany is still small relative to the western German capital stock amounting to one-tenth of the German capital stock whereas it should account for one-fifth if population size is used (Table 3).

Table 1 – Capital Stock and Investment in Eastern Germany and Western Germany (billions of deutsche marks)

	Western Germany		Eastern German capital stock[b]	
	1990	2005[a]	1990	2005
1. Gross domestic product				
Total	2,426			
Enterprises[c]	1,932			
Goods-producing sectors (mining, manufacturing, construction, electricity, gas, and water)	968			
2. Gross investment				
Total	519			
Enterprises[c]	333			
Goods-producing sectors	136			
Housing	124			
3. Gross capital stock				
Total	11,663[d]	16,891	2,916	4,223
Enterprises[c]	4,815[d,e]	6,974	1,204	1,743
Goods-producing sectors	2,056[d,e]	2,977	514	744
Housing	4,635[d,e]	6,712	1,159	1,678
For information:				
Public infrastructure	2,011[f]	2,913	503	728
4. Capital-output ratio				
Total	4.8			
Enterprises[c]	2.5			
Goods-producing sectors	2.2			

[a]Assuming a growth rate of the western German capital stock of 2.5 percent. — [b]Calculated as 25 percent of the western German capital stock in 2005. — [c]Without housing. — [d]Evaluated at replacement costs; yearly averages; excluding roads, waterways, and civil engineering (öffentlicher Tiefbau), including rail and postal services. — [e]New construction and modernization. — [f]Including roads, waterways, sewage systems, and rail and telecommunications systems; for 1988.

Source: For data see Siebert (1993c).

Table 2 – Gross Investment in Eastern Germany, 1990–1995 (billions of deutsche marks)[a]

	1990	1991	1992	1993	1994	1995[b]	Accumulated investment 1991–1995
Total	34.4[c]	92.1	117.7	134.2	157.0	180	680
Equipment		41.8	45.6	48.4	53.0	57.7	246
Buildings		50.3	72.1	85.4	104.0	122.5	433.8
Enterprise sector (including housing)		77.6	97.3	113.1	132.5	.	
Government		14.5	20.3	21.1	24.5	.	

[a]In 1991 prices; including railroads, postal services, and telecommunications. — [b]Estimate. — [c]Half of 1990 in current prices.

Source: Sachverständigenrat (1994: Tables 10, 43), Statistisches Bundesamt (1994c).

Table 3 – Gross Capital Stock in Eastern and Western Germany, Enterprise Sector,[a] 1991 and 1994

	Eastern Germany		Western Germany	
	1991	1994	1991	1994
Gross capital stock[b] (billion DM)	478	526	5,254	5,733
Potential capital productivity[c] (DM)	0.57	0.50	0.42	0.42
Production potential (billion DM)	270	262	2,180	2,395

[a]Without housing. — [b]In 1991 prices. — [c]Production potential to gross capital stock (yearly averages).

Source: Deutsches Institut für Wirtschaftsforschung and Institut für Weltwirtschaft (1995: Table 12).

III. Speculating on the Catching-Up Process

The Barro rule postulates that income differences between regions and between countries are reduced at a relatively low rate of 2 percent. This iron law of catching up is based on an empirical cross-region and cross-country analysis of catching-up processes in industrial and industrializing countries (Barro and Sala-i-Martin 1991, 1992). According to these studies, it takes decades to close a growth gap.[5] For instance, eastern Germany would need 22 years to halve the difference in income per capita and attain 74 percent of the western German level (Table A2).

In order to forecast the catching-up process, one would need a complex model of the supply side of the eastern German economy, one with a macroeconomic production function and with submodels explaining the aggregate demand of firms for capital and labor and a submodel of technical progress. Quite a few variables would have to be considered exogenously, such as the level of transfers from western Germany, the building-up of infrastructure, and the wage path.

In evaluating potential scenarios of the catching-up process, it is important to distinguish between different types of capital, since the time required to rebuild the capital stock will differ for them. Capital in the nontradables sector has been installed very quickly. A large part of this sector's capital stock is already in place. However, in the tradables sector, this will take a much longer time. Part of this sector's investment, for instance, direct investment by western German and newly founded eastern German firms, has been undertaken where profit opportunities were expected; this type of investment is associated with a negative cash flow initially — a cash-sink hole — which can be incurred because of high expected profits in the future. Other investments will have to be financed through retained earnings, which requires that profits be made. This type of investment will only come about over time. Financing investment through retained earnings is especially relevant for the newly founded small firms (for they will provide the basis of a Schumpeterian growth process in eastern Germany). The bulk of infrastructure (roads, telecommunications) will be created quickly, but mega-projects, such as a new airport for Berlin, may only be started at the end of the first decade of the next century or later, and would need another ten years to be completed. Also, new transportation axes will require time. Interpreting the spatial structure as a stock variable, adjustment will depend on such mega-projects. Finally, rebuilding the housing stock will take two or three decades.

Another aspect of the potential scenarios is what level of adjustment is aimed at. It would not be correct to go for the 100-percent solution, because gross domestic product per capita varies considerably from region to region in western Germany. Some *Länder* in western Germany only reach a good 80 percent of the western German average. Thus, it makes sense to consider a situation where eastern Germany eventually reaches 80 percent of the western German level of GDP per capita.

So far, the catching-up process that has taken place is not negligible. GDP per capita (in current prices) rose from 31 percent of the western German level in 1991 to 47.9 percent in 1994 (38.5 percent in 1992, 44.8 percent in 1993). This implies a convergence rate of roughly 6–7 percent per year, which is by far higher than the Barro rule of 2 percent.

A simple formula tells us how much time is needed for eastern Germany to catch up if the real growth rates in eastern and western Germany can be taken as given. Let Y_{94}^W and Y_{94}^E be the respective initial GDP in western and eastern Germany, α the level to be reached, β the size of the eastern German population relative to western Germany, and r^W and r^E the respective real growth rates, then

$$[1] \quad \alpha\beta Y_{94}^W e^{tr^W} = Y_{94}^E e^{tr^E},$$

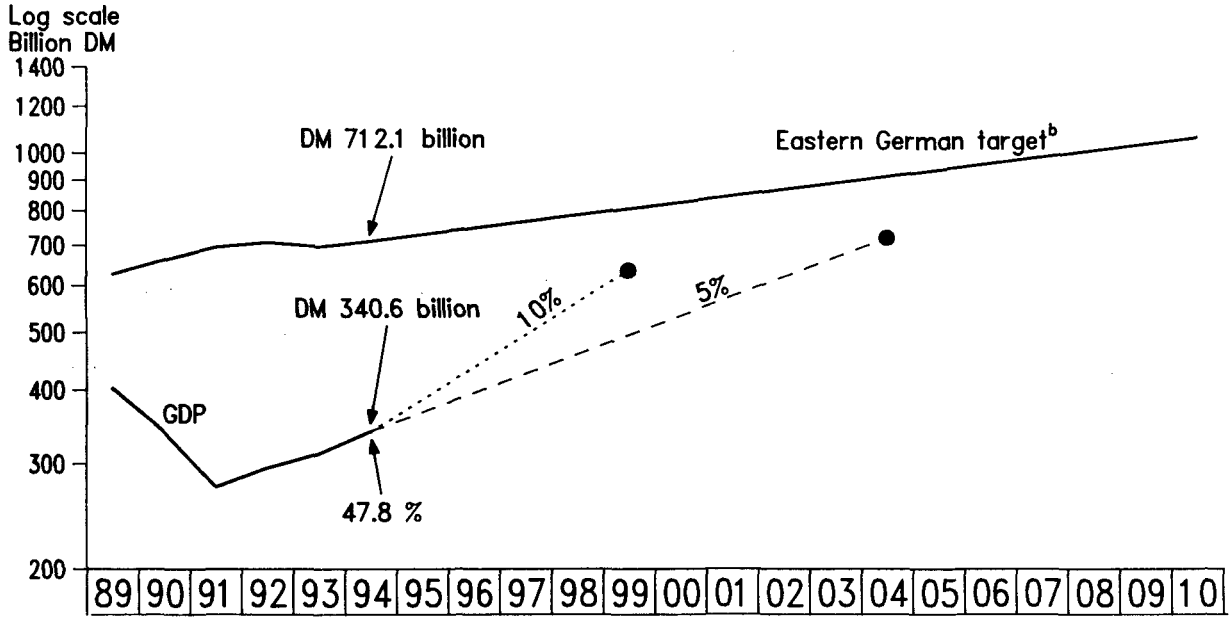
and thus

$$[2] \quad t = \frac{\ln\left(Y^E/Y^W\right) - \ln\alpha\beta}{r^W - r^E}.$$

For a given initial level of GDP in both parts of Germany, the time needed for eastern Germany to catch up depends on the difference in the real growth rates between eastern and western Germany. If the difference in growth rates between east and west were only 2 percent, it would take 26 years to reach an adjustment of 80 percent. With a 3-percent differential, it would take 17 years (13 years in the case of a 4-percent differential). Table A2 illustrates the potential catching-up paths under different growth differentials between eastern and western Germany. GDP in current 1994 prices has been used as the starting point.

Figure 5 shows the closing of the growth gap when alternative growth differences between eastern and western Germany prevail. It was assumed that western Germany will grow at a potential rate of 2.5 percent. The eastern German growth potential was estimated by correcting the western German growth potential for the size of eastern German population. For the period 1990–1994, actual GDP data were transformed into 1994 prices in order to make figures comparable. If the difference in the growth rates

Figure 5 – The Growth Gap in Eastern Germany[a]



[a] Starting level in 1994 prices, years before 1994 in 1994 prices, afterwards in real terms. – [b] Calculated using the actual western German GDP, corrected by population size (23.9 percent).

were 5 percent, eastern Germany would reach 80 percent of the western German level in GDP per capita in 2004; if the difference were 10 percent, catch-up would occur in the year 2000. Figure 5 also illustrates the valley of the J-curve in the transformation of a socialist economy, which is a reflection of the existing capital stock becoming obsolete.

In analyzing the adjustment process, it does not make sense to exclude west Berlin, since it is geographically and economically part of eastern Germany. Including west Berlin in the eastern German region means that eastern Germany starts at 53.6 percent of the west German level in 1993 — data for 1994 are not yet available. The target of a 80-percent adjustment can then be reached roughly two years earlier (Figure A2; Table A3).

Of course, the value of such mechanistic calculations should not be overestimated. It is realistic to expect that the time profile of investment will not be even. There are some reasons for it to be bell-shaped, with the greatest momentum in the period 1994–1996, implying higher growth rates of GDP in these years or shortly thereafter. It should also be noted that growth during the process of catching-up will become smaller over time (Barro and Sala-I-Martin), since the economy moves down the marginal productivity curve of capital when capital is interpreted in a broad sense.

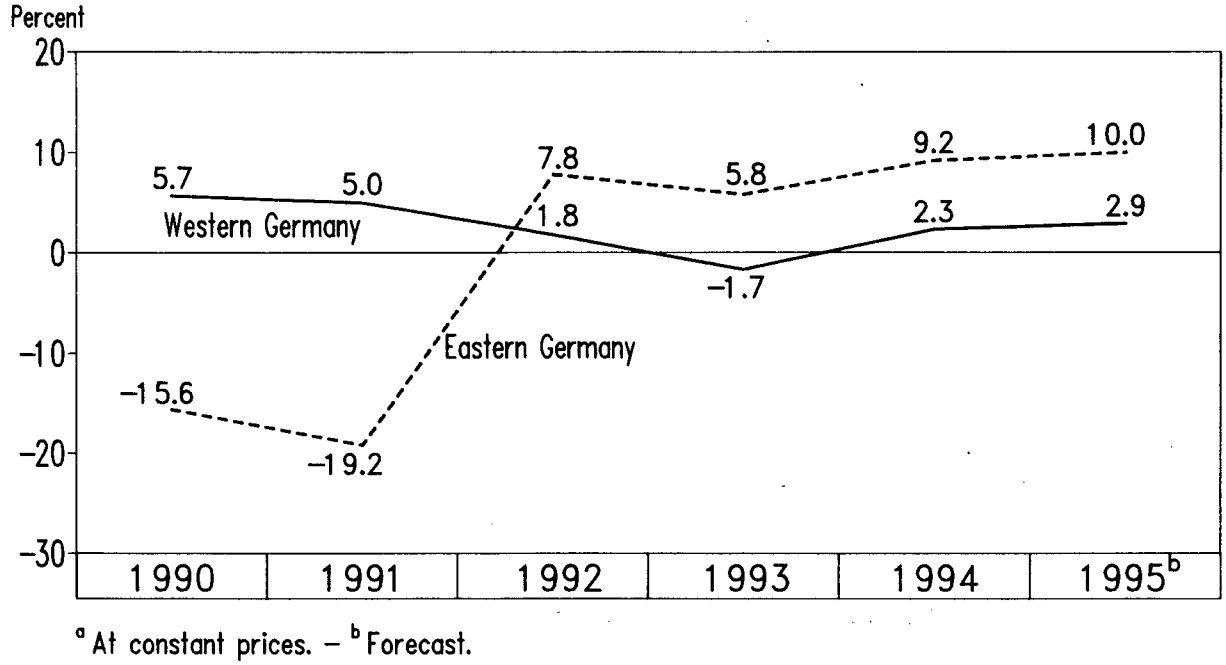
IV. Returning to Normality in Economic Policy

German unification can be interpreted as a massive structural change or as an economic shock to Germany as a whole. The shock has created a temporary excess supply of labor and a temporary excess demand for capital to rebuild eastern Germany, both in public infrastructure and in the enterprise sector. Such a structural change requires a shift in relative factor prices, which implies that the relative position of labor has become less favorable. It also implies a relocation of private capital from western to eastern Germany during the transition period. And it requires that the government provide transfers to finance investments in infrastructure, to subsidize industry in eastern Germany and to provide transfers to households (unemployment insurance, retirement). This is a shock to the German macroeconomic policy mix between fiscal policy, wage policy and monetary policy.

The need to finance annual public transfers amounting broadly to 5 percent of German GDP has changed the structural characteristics of western Germany. The budget deficit in 1994 was 3.8 percent of GDP, including the deficits of the federal government, the *Länder*, the municipalities, the Treuhand and the social security system. Government debt has doubled within five years, climbing from 41 percent to 60 percent of GDP. The tax burden has been increased, and the government share in GDP has risen from 45 to 50 percent. Germany has become a little less of a market economy and a little more of a state economy. The government's increased demand for resources has created a severe burden for the private sector, indicating that the long-term environment for economic growth in western Germany has become less favorable. The potential growth rate in western Germany has been reduced for the interim period; it is now estimated at 2 percent instead of 3 percent for the period from 1993 to 1995. The growth rate of the capital stock is below its long-run average. The recession in 1993 (Figure 6) was partly caused by Germany attempting to find a new policy mix.

This situation can only be improved if fiscal policymakers succeed in consolidating the budget, in reducing the budget deficit relative to GDP, and in bringing down the tax burden over the coming years. In the medium and in the long run, their ability to do so will be influenced by how quickly eastern Germany will catch up. This will determine the extent of transfers needed and, consequently, Germany's fiscal policy stance, which, in turn, will determine the economic conditions for wage policy and for

Figure 6 – Gross Domestic Product[a] in Eastern and Western Germany, 1990–1995 (change in percent)



[a] At constant prices. – [b] Forecast.

Source: Statistisches Bundesamt (1994a); for 1995 the Kiel Institute's forecast.

monetary policy and which will influence the growth potential in western Germany via taxation. Thus, the catching-up process defines the core of the German economic policy situation.

Germany's federal fiscal system has the principal merit of allowing a decentralization of political decision making and of giving room to regional preferences, but this same system makes a reorientation of fiscal policy in western Germany rather difficult. The *Länder* and municipalities in the west have larger expenditures than the federal government, but the larger part of the burden of adjustment arising from German reunification has been put on the federal government. The *Länder* and the municipalities in the west have taken only a smaller share in expenditure cuts than the federal government. This is a structural reason why, on the whole, fiscal policy has not reacted with sufficient expenditure cuts or caps on expenditure increases. The federal government therefore resorted to tax increases. Given the current allocation of tax revenues and burden sharing between the federal government and the *Länder*, it can be expected that the Länder will increase their expenditure in the upswing, thus not contributing to the necessary reduction of government spending.

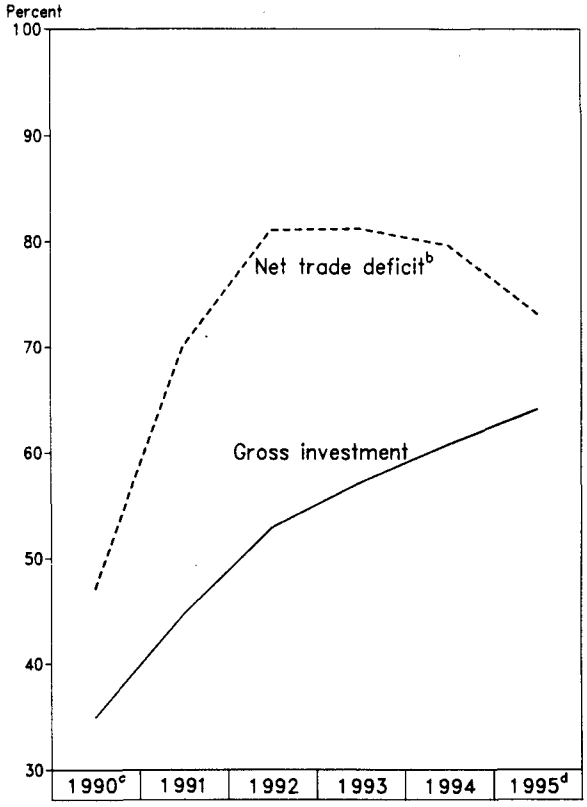
Governmental transfers to eastern Germany will have to be reduced over time, both in relation to GDP and in absolute terms. Unfortunately, it is not easy to calculate net transfers for a number of reasons: In an integrated economic area, it is extremely difficult to determine what part of non-area-specific spending by the federal government should be attributed to eastern Germany. General outlays are statistically allocated to eastern Germany in proportion to its population. A similar problem holds to some extent for public investment. In addition, it becomes more and more difficult to determine trade flows in an integrated economy and to delineate private investment activity in both parts of the country. An indicator of the size of transfers is the wedge between aggregate demand and aggregate production or the trade balance. With 65 percent of GDP, the deficit in the trade and services balance still is extremely high. The trade balance deficit indicates the gap between production and absorption. From the macroeconomic accounting identity, we have

Table 4 – Excess Consumptive Absorption and Trade Balance in Current Prices, 1991–1994 (in billions of deutsche marks)

	GDP	Consumptive absorption[a]	Investment	Net trade and services balance	Net external factor income	Unilateral transfers[b]	Current account balance[b]
1991	206.0	–267.3	–91	–152.3	8.0	114.6	29.7
1992	262.6	–328.4	–128.9	–194.8	10.8	131.9	52.1
1993	305.4	–357.8	–154.3	–206.7	9.4	134.6	62.7
1994	340.6	–381.3	–181.6	–221.8	3.7	59.3[c]	43.4[c]

[a]Private consumption plus government spending excluding governmental investment; Source: Statistisches Bundesamt, Erste Ergebnisse der Inlandsproduktsberechnung 1994. — [b]National income accounting concept; Source: Deutsches Institut für Wirtschaftsforschung (1994). — [c]First half of 1994.

Figure 7 – Gross Investment and Net Trade Deficit in Percent of GDP in Eastern Germany[a]



[a] In 1991 prices. – [b] Plus net external factor income. – [c] 2nd half of 1990. – [d] Estimate.

[3] $Y = C + I + G + X - M,$

where Y denotes GDP, C private consumption, I gross investment, G government spending, X exports and M imports. Let A stand for absorption, with $A = C + I + G$, and let A_c be consumptive absorption, with $A_c = C + G$. Then, we have

[4] $Y - A = Y - A_c - I = X - M.$

There is still an excess of consumptive absorption over production in eastern Germany; it amounted to 12 percent in 1994, but the gap is becoming smaller over time (Table 4). Instead of using GDP in equation [4], one could use GNP data, which include the net external factor income of eastern German factors of production, mostly income of commuters working in western Germany. Gross investment and the net trade deficit plus external factor income in percentage of GDP are illustrated in Figure 7. Whereas the net trade deficit relative to GDP has fallen, gross investment relative to GDP has risen. This indicates that consumptive absorption (in 1991 prices) has been reduced over time.[6] Consumptive absorption still exceeds production. Eastern Germany is not able to produce enough for its own consumption. Consumption in eastern Germany is financed by funds from "abroad".

Another approach to the external position of eastern Germany is to look at its external budget constraint. Rearranging equation [3], we have

[5] $S - I + (T - G) = N + Se + Y_{EX} + Tr = CA,$

where S denotes savings, I investment (plus change in inventories), T government tax revenues, N trade balance, Se services balance, Y_{EX} the net external factor income, Tr unilateral transfers and CA the current balance. Splitting up savings into the savings of households (S_H) and the savings of the enterprise sector (S_E), and splitting up investment into private (I_E) and public investment (I_G), we have for 1993 data

[6] $S_H + S_E - I_E - I_G + (T - G) =$

$N + Se + Y_{EX} + Tr = CA$

$33.6 + 57.3 - 130.3 - 24.0 + (302.0 - 301.4) =$

$-176.9 - 29.8 + 9.4 + 134.6 = -62.7$

Savings are not sufficient to finance investment. Investment is also financed by a negative current account of DM 62.7 billion. This figure indicates private capital inflows. External funds flowing to eastern Germany include unilateral transfers to eastern Germany amounting to DM 134.6 million, so that total inflows account for DM 197.3 billion. Note that unilateral transfers enter into the revenues of the sector "government in eastern Germany," which in equation [6] includes the social security system (unemployment, health and old-age insurance).

Rearranging equation [5] we have (1994 data in brackets)

[7] $I = -N - Se - Y_{EX} - Tr + S + (T - G)$

$(167.5) = (210.9) - 43.4,$

where DM 43.4 billion stand for the term $-Se - Y_{EX} - Tr + S + (T - G)$. This is yet another way of expressing that the net trade and services balance does not have a counterposition in investment. Taking into account that $T - G = S_G$ is savings of the government sector, equation [7] says that savings (of the private and the government sector) do not cover the deficit in the services balance and unilateral transfers.

V. Fading Impact on Germany's European Neighbors

German unification was not only a shock to Germany, but also to its European neighbors because Germany's strong demand for imports pushed up the demand for goods in neighboring countries (raising exports to Germany in some European countries by 20 percent) and stimulating economic growth in the European Union by at least half a percentage point. The opening up of a new frontier in eastern Germany also resulted in a higher rate of return for capital and higher real interest rates suppressing aggregate domestic demand in the partner countries. Thus, it was an asymmetric shock to the European Monetary System that put pressure on some of the European currencies. This eventually led to its collapse in 1992 and 1993 (Siebert 1993c). The bulk of the repercussions could have been circumvented by an appreciation of the D-Mark in 1990 or 1991, allowing other countries a lower interest rate. Moreover, the recession in Europe in 1993 could have been softened considerably. But such an appreciation was not politically acceptable. In the long run, eastern Germany will be one growth region in the European Union from the supply side and will be a growth stimulus, albeit small. In the medium run, the asymmetric shock will have fewer and fewer effects.

Appendix

Table A1 – Net Production[a] of Production Industries in Eastern Germany[b], 1990–1994

	1990 Q4	1991	1992	1993	1994 Year	1994 Q4	*Note:* Weight for 1990[c]	*Note:* Weight[d] for 1994
Total production industries	97.4	77.2	78.7	86.9	103.5	112.9	100	100
Energy	103.1	103.2	96.7	103.2	110.0	122.0	12.42	13.2
Mining	108.9	70.3	50.4	39.1	32.9	33.1	9.56	3.0
Total Manufacturing	94.1	66.1	64.3	70.1	84.8	93.6	59.95	49.1
Manufacture of basic goods	92.3	75.9	78.5	85.5	109.9	119.2	11.51	12.2
of which:								
Oil refineries	91.9	124.3	131.9	133.3	144.1	152.4	1.27	1.8
Stone, sand, and clay industries	76.2	62.1	96.6	136.4	208.9	233.1	2.51	5.1
Iron and steel industry	80.5	66.2	60.2	59.7	73.9	78.3	0.79	0.6
Foundries	90.2	55.5	42.6	36.4	44.5	50.4	1.07	0.5
Chemical industry	106.2	78.1	65.8	57.6	69.0	79.6	4.04	2.7
Manufacture of capital goods	93.1	56.2	50.7	55.5	66.0	74.8	32.90	21.0
of which:								
Manufacture of structural metal products	100.0	109.4	140.3	163.1	190.2	210.6	2.93	5.4
Mechanical engineering	92.2	51.6	32.6	31.8	33.9	40.8	15.24	5.0
Road vehicle construction[e]	91.8	49.1	54.9	83.6	113.1	126.0	2.71	3.0
Electrical engineering[e]	92.7	47.7	47.8	50.0	62.3	70.7	8.51	5.1
Precision engineering, optics, watches	116.0	23.6	29.1	20.9	24.9	29.7	1.09	0.3
Metal products	85.9	33.9	20.2	20.7	140.3	150.0	0.88	1.4
Manufacture of consumer goods	96.0	69.1	71.4	80.2	98.5	110.1	7.22	6.9
of which:								
Wood processing	103.9	75.6	79.0	96.1	105.5	119.5	1.53	1.6
Printing	94.4	113.6	128.9	126.3	150.3	165.1	1.33	1.9
Textiles	90.9	43.0	32.1	31.0	36.6	37.8	1.69	0.6
Manufacture of food, beverages, and tobacco	99.6	90.7	94.3	99.6	114.6	120.0	8.32	9.2
of which:								
Food and beverages	95.0	85,2	95.2	103.1	117.5	123.3	6.90	7.8
Tobacco	120.2	115.4	90.8	83.9	102.2	105.8	1.42	1.4
Construction industry	98.3	99.7	128.7	156.4	197.7	212.1	18.07	34.5
Building construction	96.7	104.2	123.3	148.1	200.6	214.0	8.79	17.0
Civil engineering	99.8	95.4	133.8	164.2	194.9	210.3	9.28	17.5

[a]Index of net production, adjusted by working days, 2nd half 1990=100. — [b]Including east Berlin. — [c]Weight for second half of 1990. — [d]Calculated using the index of net production adjusted by working days, multiplied by weights according to the index base. — [e]Including repair.

Source: Statistisches Bundesamt (1993a, 1994b).

Table A2 – Catching-up in Eastern Germany under Alternative Growth Differentials[a] (percent)

	Growth differential (percentage points)								
	2	3	4	5	6	7	8	9	10
1994	47.88	47.88	47.88	47.88	47.88	47.88	47.88	47.88	47.88
1995	48.84	49.33	49.83	50.33	50.84	51.35	51.86	52.38	52.91
1996	49.83	50.84	51.86	52.91	53.98	55.07	56.18	57.32	58.47
1997	50.84	52.38	53.98	55.62	57.32	59.06	60.86	62.71	64.62
1998	51.86	53.98	56.18	58.47	60.86	63.35	65.93	68.62	71.42
1999	52.91	55.62	58.47	61.47	64.62	67.94	71.42	75.08	78.93
2000	53.98	57.32	60.86	64.62	68.62	72.86	77.37	82.15	87.23
2001	55.07	59.06	63.35	67.94	72.86	78.15	83.81		
2002	56.18	60.86	65.93	71.42	77.37	83.81		(5.70)	(5.13)
2003	57.32	62.71	68.62	75.08	82.15		(6.42)		
2004	58.47	64.62	71.42	78.93		(7.33)			
2005	59.66	66.59	74.34	82.98	(8.56)				
2006	60.86	68.62	77.37						
2007	62.09	70.71	80.53	(10.27)					
2008	63.35	72.86							
2009	64.62	75.08	(12.84)						
2010	65.93	77.37							
2011	67.26	79.73							
2012	68.62	82.15							
2013	70.01								
2014	71.42	(17.11)							
2015	72.86								
2016	74.34								
2017	75.84								
2018	77.37								
2019	78.93								
2020	80.53								
	(25.67)								

[a]The figures in parentheses show the number of years needed for eastern Germany to reach 80 percent of western Germany's level. 1994 GDP in current prices as starting values. Population ratio 0.239.

Source: Statistisches Bundesamt (1994b); own calculations.

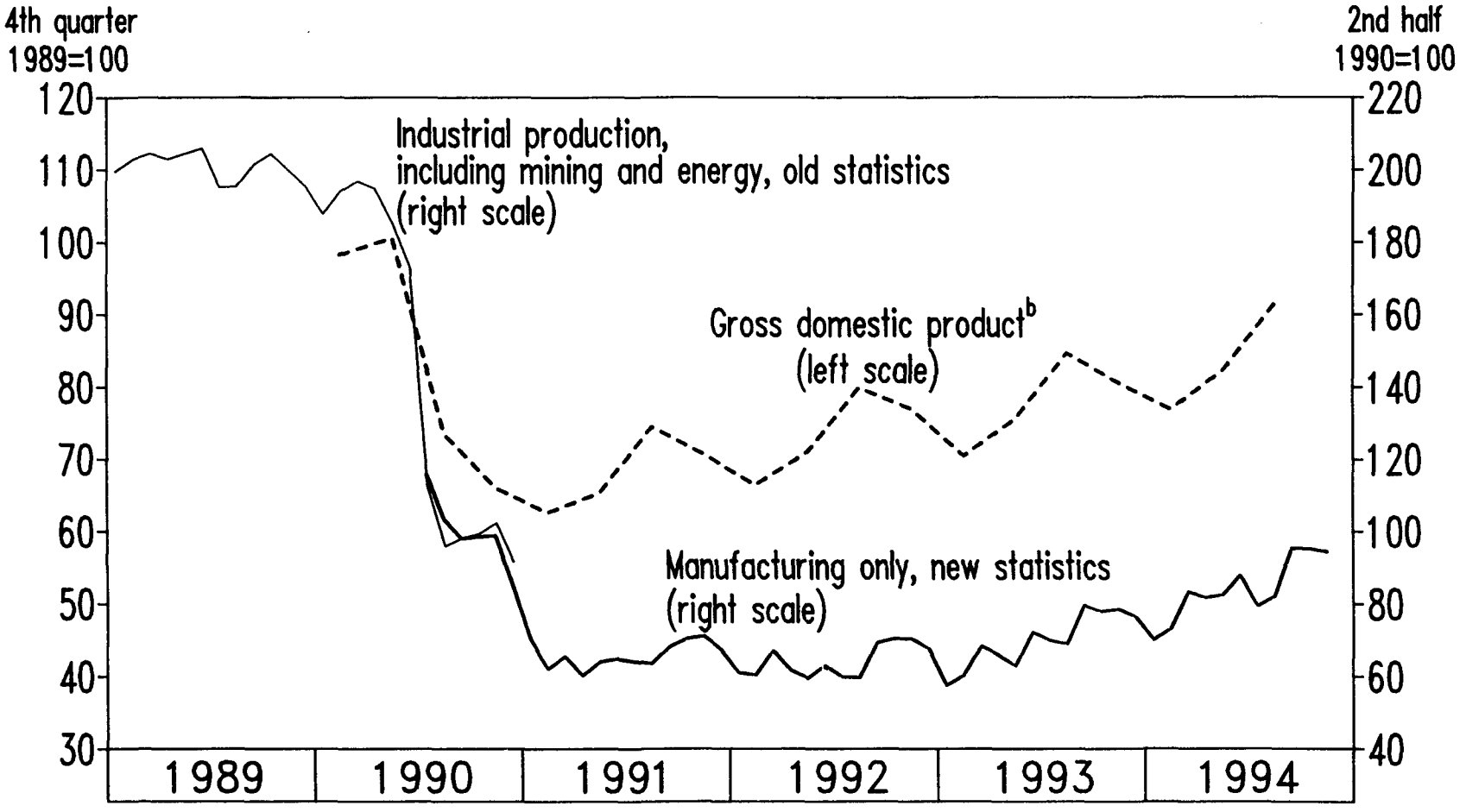
Table A3 – Catching-Up in Eastern Germany under Alternative Growth Differentials[a], including West Berlin (percent)

	Growth differential (percentage points)								
	2	3	4	5	6	7	8	9	10
1993	53.58	53.58	53.58	53.58	53.58	53.58	53.58	53.58	53.58
1994	54.66	55.21	55.76	56.32	56.89	57.46	58.04	58.62	59.21
1995	55.76	56.89	58.04	59.21	60.41	61.63	62.87	64.14	65.44
1996	56.89	58.62	60.41	62.25	64.14	66.10	68.11	70.18	72.32
1997	58.04	60.41	62.87	65.44	68.11	70.89	73.78	76.79	79.93
1998	59.21	62.25	65.44	68.79	72.32	76.03	79.93	84.02	88.33
1999	60.41	64.14	68.11	72.32	76.79	81.54	86.58		
2000	61.63	66.10	70.89	76.03	81.54			(4.45)	(4.01)
2001	62.87	68.11	73.78	79.93		(5.73)	(5.01)		
2002	64.14	70.18	76.79	84.02	(6.68)				
2003	65.44	72.32	79.93						
2004	66.76	74.52	83.19	(8.02)					
2005	68.11	76.79							
2006	69.48	79.13	(10.02)						
2007	70.89	81.54							
2008	72.32								
2009	73.78	(13.36)							
2010	75.27								
2011	76.79								
2012	78.34								
2013	79.93								
2014	81.54								
	(20.05)								

[a]The figures in parentheses show the number of years needed for eastern Germany to reach 80 percent of western Germany's level. West Berlin is taken as part of eastern Germany, not western Germany. 1993 GDP in current prices as starting values. Population ratio 0.279.

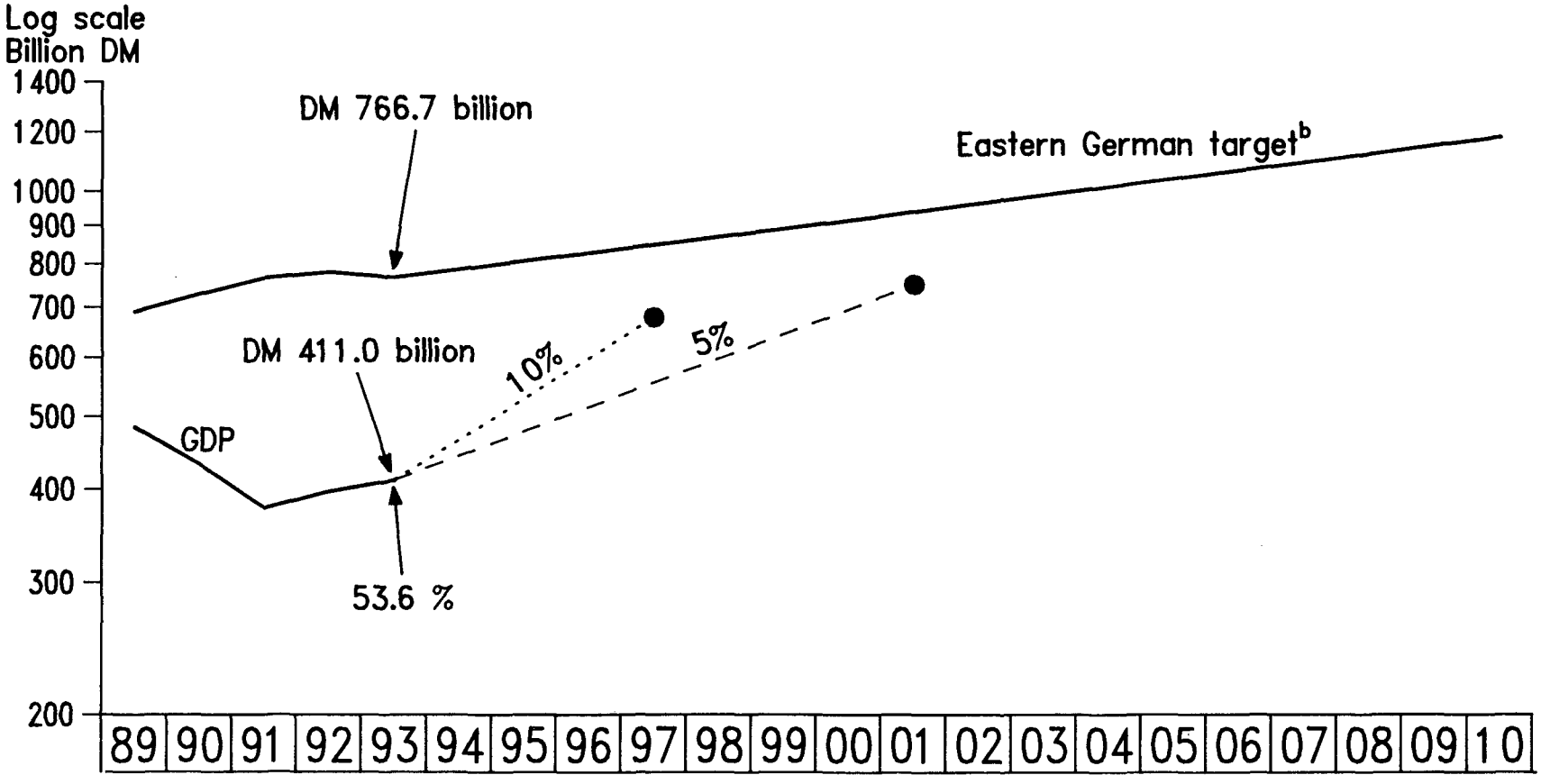
Source: Statistisches Bundesamt (1994b); own calculations.

Figure A1 – Industrial Production and GDP in Eastern Germany, 1989–1994[a]



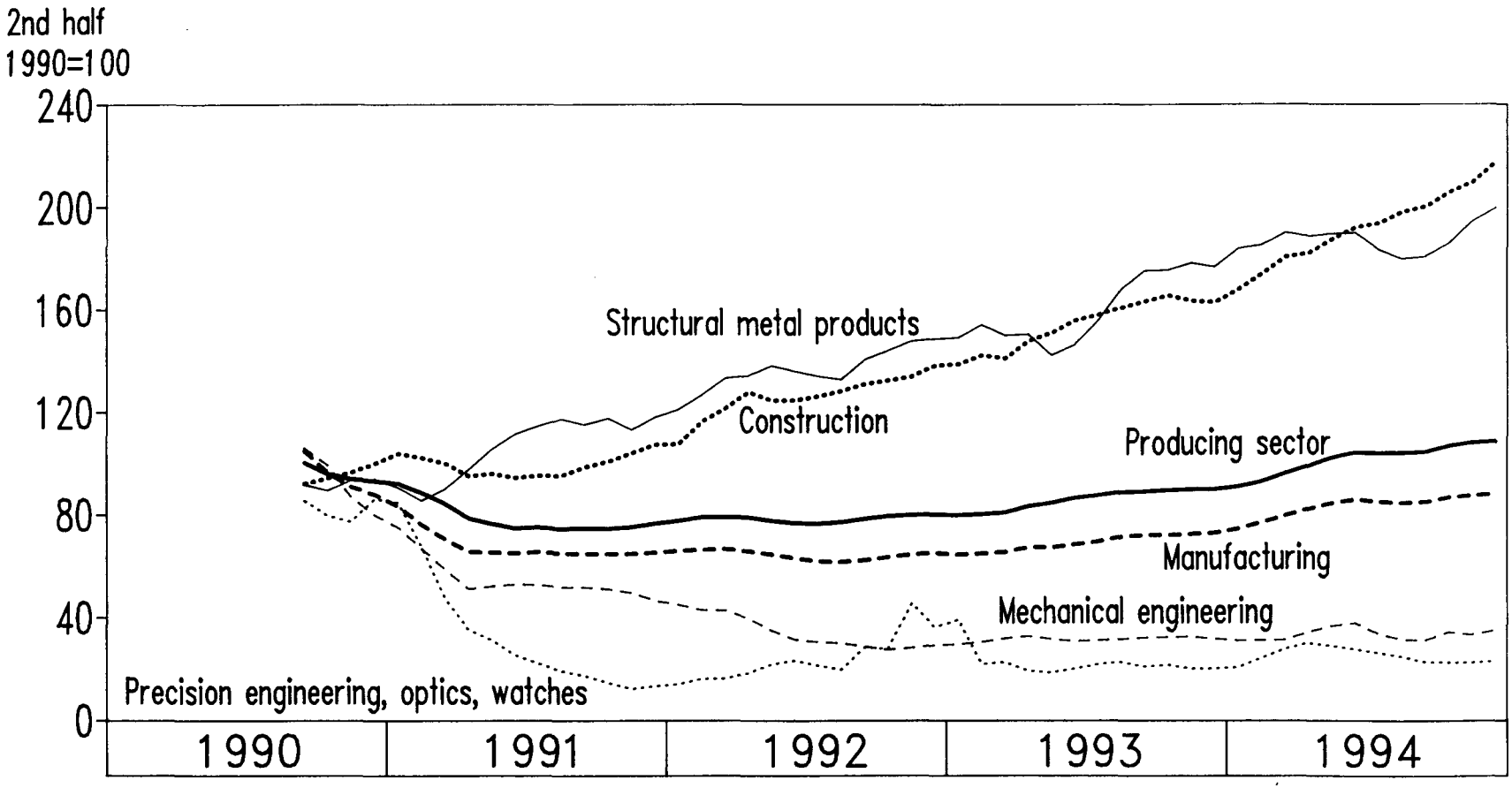
[a] Quarterly data for GDP, monthly data for industrial production. – [b] In 1991 prices.

Figure A2 – The Growth Gap in Eastern Germany including West Berlin



[a] Starting level in 1993 prices, years before 1993 in 1993 prices, afterwards in real terms, including west Berlin. – [b] Calculated using the actual western German GDP, corrected by population size (27.9 percent).

Figure A3 – Production in Selected Industries in Eastern Germany, 1990–1994



[a] Seasonally adjusted and adjusted for working days; 3-month moving average.

Endnotes

1 A similar, albeit less fundamental, devaluation of the capital stock resulted from the oil crises (Berndt and Wood 1986). The unexpected increase in the oil price reduced the marginal efficiency of the existing capital stock, and part of the existing plants, which had been installed expecting energy prices to remain at low levels, became obsolete. Comparable processes, related to many factors of production, characterize the transition from a centrally planned economy to a market economy.

2 The empirical measurement of the J-curve is fraught with considerable difficulties because production indices have been distorted. The transition implies a sizable change in the price system, and indices of production use the obsolete price weights of the pre-reform period. For instance, data on eastern Germany's industrial output were based on the 1985 price weights up to the end of 1990. Of course, quantities are themselves distorted because of false prices. As a result, the initial distortion of the output structure is transferred into the volume index. All this amounts to an overrepresentation of old, obsolete products and an underrepresentation of new, innovative output. Moreover, statistics from the central planning era may have been deliberately beautified, and gross and net values of production may have been falsely specified. Consequently, the drop in production immediately resulting from the adjustment shock may easily be exaggerated. A third statistical misrepresentation of production follows from the fact that the output of small, newly established firms is often not recorded.

3 Note that, for reasons of comparability, GDP in Figure 2 is in constant 1991 prices. Since 1991 prices in eastern Germany were still partially distorted, Figure 2 does not fully reflect the sectoral change.

4 Comparisons of eastern and western German economic data suffer from a dilemma. To analyze a development over time, for instance, productivity, one would want to exclude price effects and consequently use constant prices. In the official statistics, 1991 prices are applied. Unfortunately, prices were still distorted in eastern Germany in 1991, so that the data for the following years are also distorted. Therefore, if one is not interested in past developments but in determing the actual relative position of eastern Germany, for instance, as a starting point for the future, current prices should be used.

5 The convergence rate, i.e., the rate at which the gap between the per capita income of two countries is reduced, is equal to the difference in real growth rates. Using the same notations as in equations [1] and [2] and letting B denote population size, the relative income position in period t, y_t, is defined as

(i) $$y_t = \frac{Y_t^E}{B_t^E} \Big/ \frac{Y_t^W}{B_t^W} = \frac{1}{\beta}\frac{Y_t^E}{Y_t^W} \quad \text{with} \quad \beta = B_t^E / B_t^W .$$

GDP in period t is given by

(ii) $$Y_t^E = Y_0^W e^{rt^E}$$

(iii) $$Y_t^W = Y_0^W e^{rt^W} .$$

The convergence rate $\hat{y}$ is

(iv) $$\hat{y}_t = \dot{y}_t / y_t = r^E - r^W .$$

6 As in other comparisons, the statement depends on whether constant or current prices are used. Even with current prices, consumptive absorption is still positive.

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